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(54) Machine for automatically binding banknotes and the like by means of a thermosealable strip.

(57) There is disclosed an automatic machine for applying strips or bands to a banknote pack, in order to hold the banknotes together.

The machine essentially comprises a working table (5), consisting of movable parts, thereon there is laid and automatically cut a thermosealable strip length, which is supplied from striproll (1).

With the working table, provided with a central portion effective to be displaced along a vertical axis and two side members effective to be inwardly bent and carrying suitably shaped bracket members (7, 7'), a cantilever arm displaceable along a vertical axis and an electrically heated punch member, mounted at the base of a small column (1), are provided for cooperating.

The mentioned small column, in particular, is supported by a rotating arm radially arranged on a vertically extending rod which can be displaced along its axis.

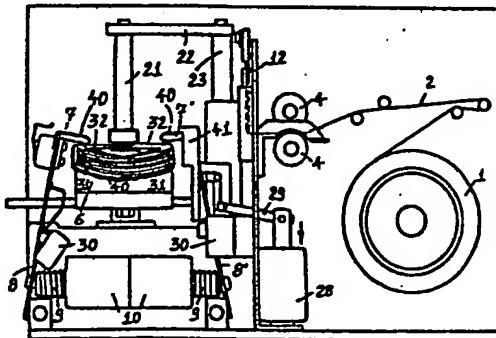


Fig. 4

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BACKGROUND OF THE INVENTION

The present invention relates to an automatic machine for automatically binding a banknote pack or the like, by using a thermosealable strip.

As is known, it is a conventional practice to hold the banknotes forming a banknote pack together by means of a small paper strip or band, the end portions of which are glued to one another.

The glueing operation, as it should be apparent, is also used for holding together, in a single pack, small bills, cards and the like.

The presently commercially available machines for carrying out the above mentioned operation, are structurally and operatively rather complex.

The same machines, moreover, present operation limitations, with regards the size and thickness of the banknote packs to be bound.

SUMMARY OF THE INVENTION

Thus, the task of the present invention is to provide such a banknote pack binding machine which

is able of automatically arranging a portion of a suitable material strip about a pack of banknotes or the like, with a superposition of the end portions of the strip itself.

Within that task, it is a main object of the present invention to provide such a banknote pack binding machine which is able of coupling, in a completely automatic way, the end portions of a banknote pack binding strip.

Another object of the present invention is to provide such a banknote pack binding machine which is able of processing different size and thickness banknote packs.

According to one aspect of the present invention, the above mentioned task and objects, as well as yet other objects which will become more apparent hereinafter, are achieved by a banknote pack binding machine, characterized in that it essentially comprises a working table, consisting of movable parts, thereon there is laid and automatically cut a thermosealable strip length being supplied from a strip roll, with said working table, having a central portion effective to be displaced along a vertical axis and two side

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members effective to be inwardly bent and carrying suitably designed bracket members, a cantilever arm member displaceable along a vertical axis and an electrically heated punch member, mounted at the base of a small column supported on a rotating arm radially arranged on a vertical rod displaceable along the axis thereof, being provided for cooperating.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the banknote binding machine according to the present invention will become more apparent hereinafter from the following detailed description of a preferred embodiment of the machine itself, being illustrated, by way of a not limitative example, in the accompanying drawings, where:

fig.1 is a perspective schematic side view illustrating the banknote pack binding machine according to the present invention;

fig.2 is a front perspective view illustrating schematically the banknote pack binding machine according to the invention;

and

figs.3 and 4 illustrate the operation mode of the subject machine.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the figures of the accompanying drawings, the banknote pack binding machine according to the present invention, comprises a strip roll 1, for supplying a thermosealable strip 2 which, as suitably conveyed by idle rollers 3, is engaged between a pair of strip entraining driven sprockets and fed to a working table, indicated overall at 5.

This working table is essentially formed by a shaped body 6 consisting of a horizontally extending parallelepipedal structure, the top face or surface 6' of which is provided with two downwardly slanted side portions converging to a horizontal flat central portion.

Upstream and downstream of the above mentioned shaped body there are arranged two bracket members, indicated respectively at 7 and 7' therebetween there are arranged the end portions of a resilient strip indicated at 40.

The brackets 7 and 7' are mounted on corresponding vertically extending arms 8 and 8' which are articulated at the bottom thereof and pivoted to the movable armatures 9 of corresponding electromagnets 10.

It should be pointed out that the resilient strip

40 allows for the end portions of the thermosealable strip to be superimposed in such a way as to cause them to adhere to the banknote pack, independently from the specific size of the banknote pack to be processed.

The bracket 7, arranged downstream of the mentioned shaped body, carries a microswitch 11, whereas upstream of the bracket 7' there is provided a blade 12 effective to be displaced in a vertical plane by means of a lever arm 13.

The mentioned shaped body 6 is supported by a vertically extending rod 14 which is telescopically coupled to an underlying tubular element 15 and is upwardly biased by a coil spring 16, or other resilient member, housed in said tubular element.

A horizontally extending arm 17 cooperates with said shaped body, said arm being mounted on a vertical-axis rack 18 and having its free end 19, provided for contacting the top face of said shaped body, formed with a substantially triangular cross-section.

The banknotes binding machine according to the present invention further comprises an electrical-

ly heated punch member 20 which is mounted at the base of a small column 21 having a vertical axis.

The column 21 is supported by a horizontally extending arm 22 which radially extends on and is rigid with a preferably round cross-section vertical rod 23 which can be rotated about its axis.

The mentioned vertical rod, in particular, carries, cantilever-wise, a fork-like structure or small frame 24 thereto there is rotatably coupled the movable armature 25 of an electromagnet or solenoid 26.

That same vertical rod, moreover, is able of sliding along its longitudinal axis, in a cylindrical seat 27, having a corresponding cross-section, under the control of a further electromagnet 28, or the like operatively equivalent device, which acts on a suitable rigid return system 29.

There are further provided two micro-switches 30 which, as they are engaged by the vertical arms supporting the above mentioned brackets, cause said electrically heated punch member supporting vertical rod to rotate and lower.

Thus, as the machine is operated, the sprockets 4 push the strip 2 along the working table 5, to

cause said strip end to engage the lever of the microswitch 11, the closure of which will cause the blade 12 to lower in such a way as to cut the strip to the desired length.

Then, the banknote pack 31 is arranged above said strip, at the shaped body 6, and, through a suitable drive, the arm 17 is caused to lower, said arm being counterbiased by the rack 18.

The arm 17, in turn, presses, by its dihedral portion 19, on the bancknote pack, in such a way as to downwardly push it jointly to the shaped body 6, as it is shown in figure 4.

As said shaped body 6 is lowered, the electromagnets 10 are operated which cause the vertical bracket bearing arms 8 and 8' to be inwardly deflected or bent.

These arms, therefore, act on the free end portions 32 of the strip length 2 in such a way as to bend it on the sides of the banknote pack 31 which is abutted against a movable abutting surface 41, and on the arm 19, overlaying said banknote pack, to cause the end portions of the strip to superimpose one another.

Then the electromagnet 26 is operated by

the microswitches 30, which electromagnet rotates the rod 23 and hence the small column 21 in such a way as to bring the electrically heated punch member 20 in a vertical arrangement with respect to the mentioned arm 19.

Then (see figure 4) the electromagnet 28 is operated which, through the rigid system 29, presses said punch member on the two superimposed end portions of the strip, in such a way as to thermoseal them.

After this operation, which is suitably timed, the arm 22 is raised again and it rotates in such a way as to bring the small column 21 to its rest position.

Then the surface 17 is raised again, under the control of the motor, whereas the shaped body 6, biased by the spring 16, returns to its starting position in such a way as to allow for the arm 19 to be disengaged from the banknote pack, which is now in a well bound condition.

From the above disclosure and the observation of the figures of the accompanying drawings, the great functionality and use facility characterizing the banknote pack binding machine according to the present invention will be self-evident.

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While a preferred embodiment of the subject banknote pack binding machine has been disclosed and illustrated, it should be apparent that this embodiment is susceptible to many modifications and variations all of which come within the scope of the invention itself, as defined in the accompanying claims.

C L A I M S

1- A banknote pack binding machine, characterized in that it essentially comprises a working table, consisting of movable parts, thereon there is laid an automatically cut a thermosealable strip length being supplied from a strip roll, with said working table, having a central portion effective to be displaced along a vertical axis and two side members effective to be inwardly deflected and carrying suitably designed bracket members, a cantilever arm member displaceable along a vertical axis and an electrically heated punch member, mounted at the base of a small column supported on a rotating arm radially arranged on a vertical rod displaceable along the axis thereof, being provided for cooperating.

2- A banknote pack binding machine, according to the

preceding claim, characterized in that it comprises a strip roll carrying a thermosealable strip material which, as conveyed by idle rollers, is engaged between a pair of entraining driven sprockets and fed to said working table which essentially consists of a shaped body formed by a substantially horizontally extending parallelepipedal structure the top face of which is formed with two downwardly slanted side surfaces converging to a horizontal flat central portion.

3- A banknote pack binding machine, according to the preceding claims, characterized in that upstream and downstream of said shaped body there are arranged two brackets, mounted on corresponding vertically extending arms supporting the end portions of a resilient strip and pivoted at the bottom and articulated to the movable armature of corresponding electromagnets, the bracket arranged downstream of said shaped body bearing a microswitch and upstream of the other bracket a blade being provided for displacement in a vertical plane under the control of a lever arm.

4- A banknote pack binding machine, according to one or more of the preceding claims, characterized in that said shaped body is supported by a vertically extending rod telescopically coupled to an underlaying tubular element and being upwardly biased by a coil spring or the like operatively equivalent member housed in said tubular element, a horizontally extending arm cooperating with said shaped body, said arm being mounted on a vertical-axis rack and having its free end, provided for contacting the top surface of said shaped body, formed with a substantially triangular cross-section.

5- A banknote pack binding machine, according to one or more of the preceding claims, characterized in that said electrically heated punch member is mounted at the base of a vertical axis small column which is supported by a horizontally extending arm, radially extending on and rigid with a vertical rod of preferably round cross-section, effective to rotate about its axis.

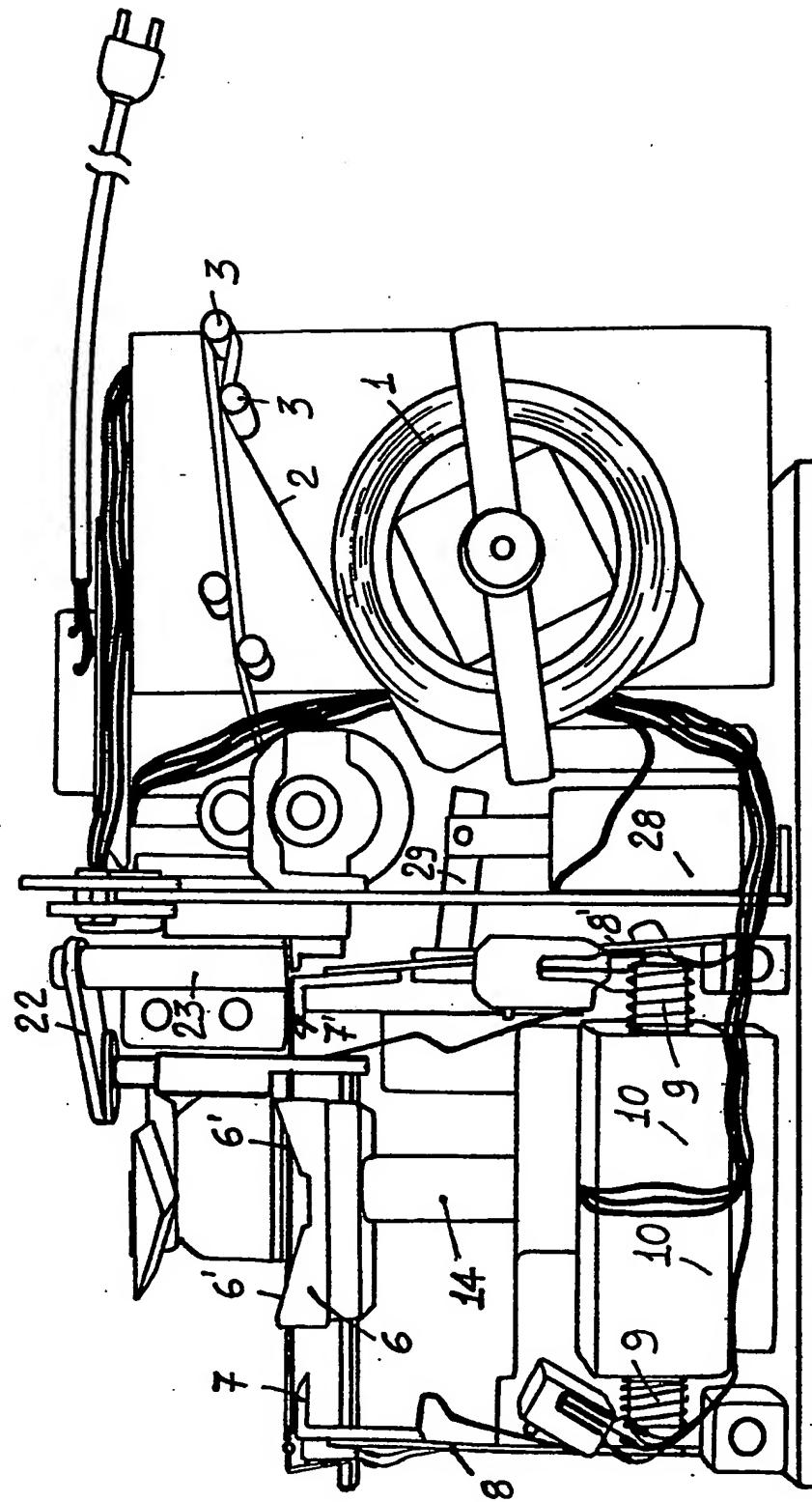
6- A banknote pack binding machine, according to one

or more of the preceding claims, characterized in that said vertical rod supports, cantilever-wise, a fork-like structure thereto there is rotatably coupled the movable armature of an electromagnet, said vertical rod being moreover effective to slide along its longitudinal axis in a corresponding cross-section cylindrical seat under the control of a further electromagnet or other operatively equivalent member or device, acting on a suitable rigid return system.

7- A banknote pack binding machine, according to one or more of the preceding claims, characterized in that it comprises two microswitches which, as they are engaged by the vertical arms supporting said brackets, cause said vertical rod to rotate and lower.

8- A banknote pack binding machine according to one or more of the preceding claims, characterized in that it is provided with a movable abutting surface.

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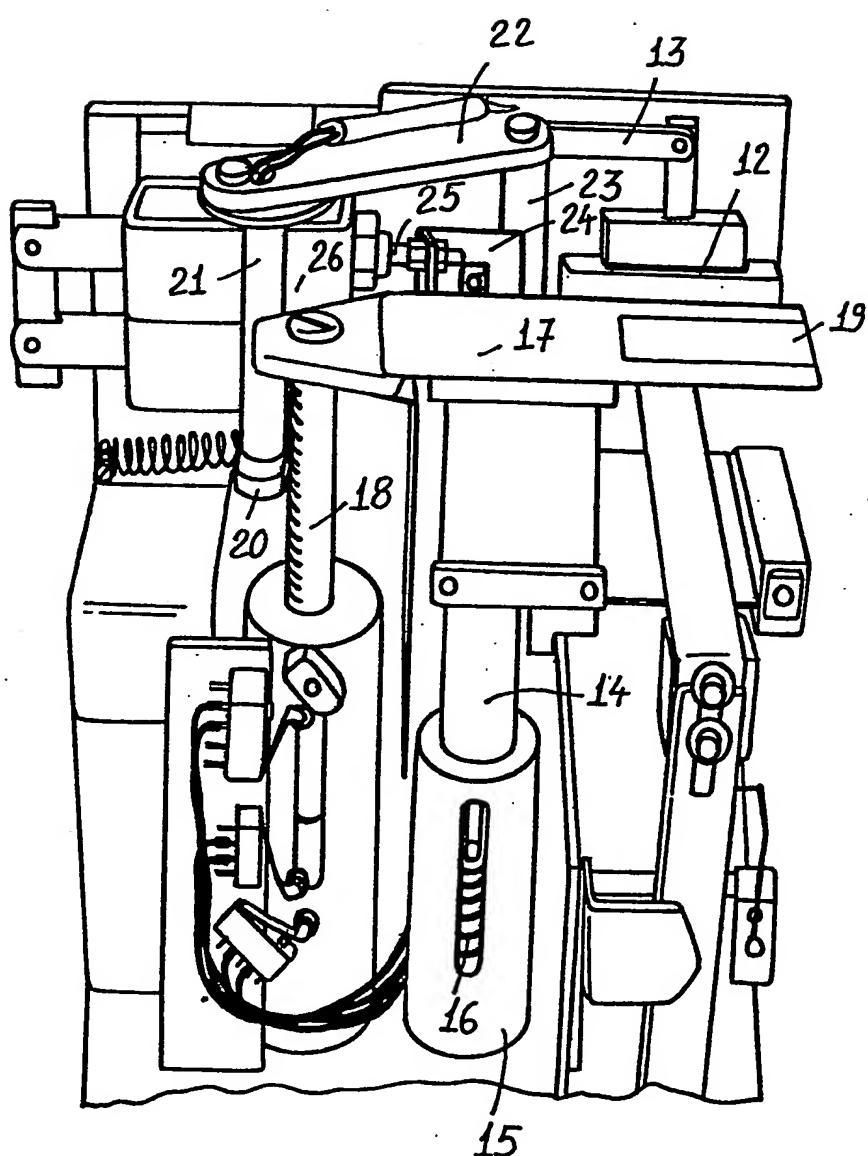


FIG. 2

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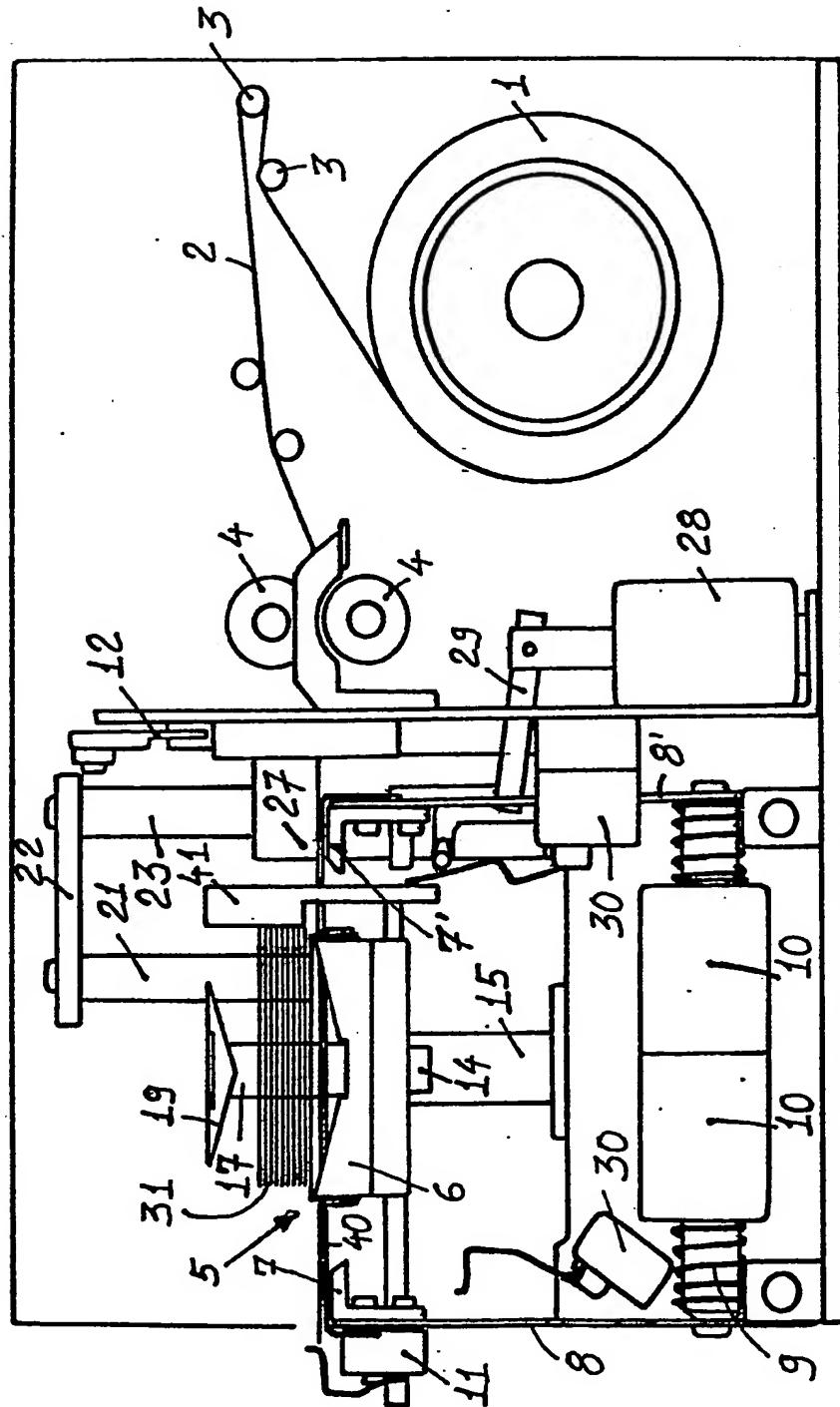


FIG. 3

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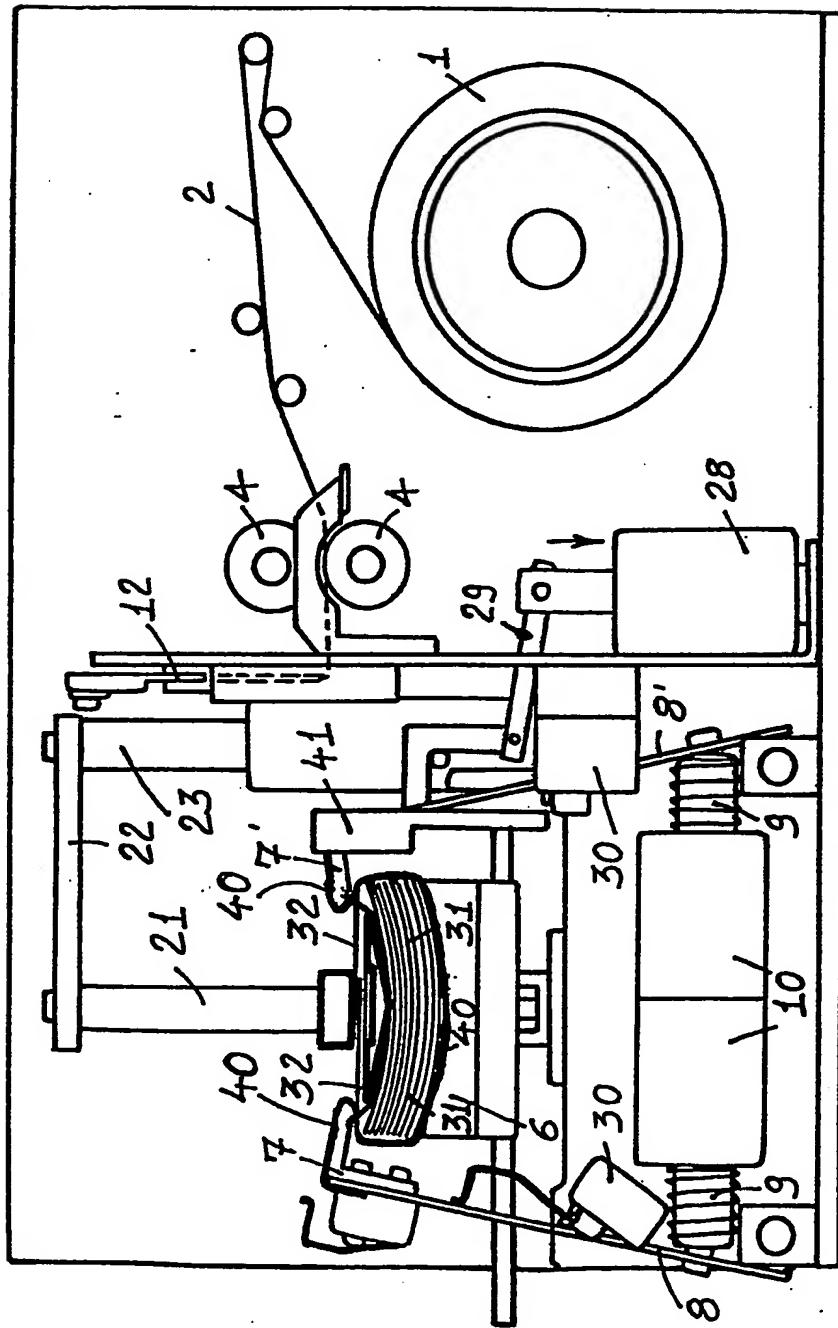


Fig. 4



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## EUROPEAN SEARCH REPORT

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Application number

EP 87 83 0074

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
X	GB-A-2 027 666 (GAO) * Page 2, line 72 - page 3, line 24; figures 3a-3m *	1	B 65 B 27/08
A	---	2,4	
A	GB-A-1 053 512 (GEVAERT) * Page 2, line 105 - page 3, line 26; figures 1-4 *	1,2,8	
A	US-A-1 649 327 (SHELDON) * Page 4, line 103 - page 5, line 56; figures 8-11 *	3	
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			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 65 B
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	09-06-1987	CLAEYS H.C.M.	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			